Space Weather Forecast

Issued on Friday, 29 October 2021 at 01:30 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of G3/Strong Geomagentic Storms on 30th/31st. Moderate or Low Solar Activity with a slight chance of further X-flares/R3 Radio Blackouts.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar Activity is High with two Moderate class flares and one Strong flare observed from a complex and moderately sized sunspot in the southern centre disc. There are five sunspot regions in total on the Earth-facing solar disc, with one other notable region in the northeast which also has the potential for producing Moderate or Strong class flares. All other regions are small and simple. The Strong flare from the southern centre disc region resulted in a large Earth-directed Coronal Mass Ejection (CME). This is expected to arrive at Earth later on in the UTC day on the 30th.

Solar Wind / Geomagnetic Activity: Solar winds were at background levels, with speeds falling from 330km/s to around 300km/s. The magnetic field carried by the wind (IMF) was weak with no notable component in the north-south direction. Geomagnetic activity remained Quiet.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background until after the Strong flare. An S1 (Minor) radiation storm was observed from 28/1740 UTC and remained above this threshold to the end of the UTC day.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate to Low solar activity is forecast with further Moderate-class flares possible. These most likely from either the moderately complex sunspot in the southern centre disc or the other complex region in the northeast.

Solar Wind / Geomagnetic Activity: A large CME from a Strong flare eruption on the 28th has been analysed and is forecast to arrive at Earth later on Day 2 (30th). A glancing impact from a passing CME is also possible late Day 2 or early Day 3 but is low confidence. No other CMEs are currently expected to arrive at Earth. Otherwise solar winds are expected to remain mostly at background through the period. Geomagnetic activity is forecast to be mainly Quiet on Day 1 and early Day 2, with a slight chance of Unsettled intervals. From later Day 2 Minor Geomagnetic storms (G1/G2) are expected, with a chance of G3/Strong Storms. Geomagnetic activity is then expected to subside during Day 3 and Day 4 (1st November) with an eventual return to mainly Unsettled levels, with a chance of Active intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) will start Day 1 (29th) above the S1/Minor storm level. In the absence of any further significant flares the high energy proton flux is expected to return to background levels during Day 1, but with a continued slight chance of reaching the S1 level again with any notable flares from the significant sunspot regions on the Earth-facing disc.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	80	40	10
Strong	G3	No	1	40	10	1
Severe	G4	No	1	10	3	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	40	40
Very Active	R3 to R5 X	Yes	10	10	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	100	20	10	20
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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